



STREAM RESTORATION PLAN

PADUA STABLES PROJECT FAYETTE COUNTY, KENTUCKY

Prepared for:

**U.S. ARMY CORPS OF ENGINEERS
LOUISVILLE DISTRICT**
USACE ID No. LRL-2008-1247

and

KENTUCKY DIVISION OF WATER
AI No. 80587

November 2009

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Submitted by:

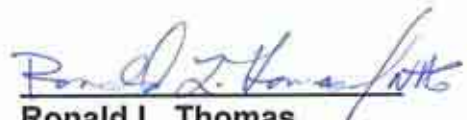
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EXECUTIVE SUMMARY

Padua Stables (KY), LLC has undertaken the re-establishment of a working thoroughbred horse farm on the subject property. The farm is located southwest of the intersection of Old Frankfort Pike and Alexandria Drive in Fayette County, Kentucky. Work in 2008 inadvertently resulted in unauthorized impacts to on-site intermittent streams through piping flows from existing stream channels and regrading drainageways to allow horses safe access to all portions of the existing pastures.

The Kentucky Division of Water issued a Notice of Violation to Three Chimneys Farms for these impacts, dated September 3, 2008. Based on a determination by the U.S. Army Corps of Engineers in May 2009, jurisdictional features within the impacted area included four intermittent streams totaling 4,396 feet and one ephemeral stream totaling 660 feet.

Padua Stables (KY), LLC proposes to compensate for these impacts through a combination of on-site restoration and enhancement as well as payment of an in-lieu fee to the Kentucky Stream and Wetland Restoration Fund. Approximately 4,122 feet of on-site intermittent streams will be restored to pre-existing conditions with the exception of five permanent stream crossings, which are proposed to allow horse and equipment safe access to pastures. Additional on-site mitigation includes the enhancement of 1,406 feet of intermittent stream through the planting of a wooded riparian corridor. The remaining required mitigation will be provided through payment of \$87,200 in-lieu of formal mitigation.

This restoration plan provides the required project information in a format consistent with the new federal guidance *Compensatory Mitigation for Losses of Aquatic Resources: Final Rule* (April 10, 2008).

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1.0 OBJECTIVES

This Stream Restoration Plan (Plan) has been developed to resolve the unauthorized filling of intermittent streams on the Padua Stables (KY), LLC (Padua) farm. The approximately 340-acre farm is located west of Alexandria Drive and southwest of Old Frankfort Pike in Lexington, Fayette County, Kentucky (Figure 1).

Prior to purchase by Padua, the former horse farm property was utilized for row crops, hay, and livestock grazing. The property was purchased by Padua in March 2008 for use solely for thoroughbred horse husbandry. The farm has undergone numerous renovations, including construction of new fencing and barns, and restoration of existing houses and pastures. In 2008, drainage improvements were started to maximize the safe usage of all on-site pastures by horses. These drainage improvements resulted in unauthorized impacts to 4,396 feet of intermittent stream and 660 feet of ephemeral stream through grading and piping activities.

In September 2008, the U.S. Army Corps of Engineers (USACE) and the Kentucky Division of Water (KDOW) performed a site visit, determined that a violation had occurred, and stated that no additional work should be performed. Following the agency site visit, a Notice of Violation was issued to Three Chimneys Farm by the KDOW, dated September 3, 2008, stating that the appropriate applications should be submitted to the USACE and KDOW to resolve the impacts. In October 2008, Brad Caron, of Three Chimneys Farm, submitted initial applications to the USACE and KDOW. Based on a May 2009 site visit, the USACE determined that the total length of intermittent stream impacted was 4,396 feet. Revised permit applications were submitted to the USACE and KDOW on July 10, 2009.

The goal of this project is to resolve the unauthorized stream impacts and provide Padua with safe pasture access for horses throughout the farm. This Plan presents site information and restoration designs following the current federal guidance *Compensatory Mitigation for Losses of Aquatic Resources: Final Rule* (April 10, 2008). The specific objectives of the Plan are to provide for:

- the restoration of pre-existing conditions for on-site intermittent streams
- the establishment of a wooded riparian corridor along downstream portions of the stream channels
- the construction of five safe crossings to be used as access points by horses and equipment.

2.0 SITE SELECTION

The restoration site selection was dictated by the need to resolve unauthorized impacts as well as eliminate current and future detrimental impacts to the on-site streams. The site was evaluated based on the needs of the project, on-site availability for mitigation, and the practicability of implementing mitigation in the stream restoration areas. These factors are discussed in more detail below.

2.1 WATERSHED NEEDS

The Padua farm is located within the Town Branch watershed, which contains a variety of land uses including commercial, industrial, agricultural, institutional, and residential development (Figure 1). The present demand for commercial, industrial, and residential developable land within the Town Branch watershed has resulted in impacts to numerous streams. Agricultural land uses have also resulted in stream degradation through channelization, wooded riparian corridor removal, and runoff from cultivated fields. Based on the historic loss of stream habitat due to these land use practices, the restoration of stream functions within the immediate vicinity and watershed of impact are needed. Additionally, the restoration of on-site streams will directly mitigate the loss of stream function due to the on-site stream impacts.

2.2 FUNCTIONAL ANALYSIS

Intermittent streams typically provide a variety of functions including flood attenuation, wildlife habitat, and the transfer of woody organic matter from headwater streams to larger downgradient stream. Based on a review of aerial and site photographs prior to impacts, on-site streams were significantly degraded from agricultural practices and provided only limited functions. The on-site streams flow into Town Branch either directly or via Wolf Run (Figure 1). These streams are listed on the 303(d) List of Surface Waters of Kentucky as being impacted by fecal coliform and nutrient enrichment, which increases with livestock grazing.

Impacts to on-site streams will be restored through the re-establishment of 4,122 feet of intermittent stream and enhancement of woody riparian zones along 1,406 feet of intermittent streams. The restored/enhanced streams will be fenced to exclude horses, which will protect downstream waters from increased sedimentation and will minimize fecal coliform and nutrient loading associated with farm operations.

2.3 PRACTICABILITY

The proposed stream mitigation area was assessed during a site visit on October 26, 2009. The long-term success and sustainability of the proposed mitigation efforts are further discussed below in terms of hydrology and vegetation.

2.3.1 Hydrology

The proposed stream restoration corridors are located in natural low drainageways that collect runoff from adjacent farm fields, roadways, ponds, and neighboring properties. Additionally, the farm is located in a high karst area, which increases surface water infiltration for most headwater streams and leads to more sustained inputs from seeps and springs at lower elevations. This is observed on this site where streams at lower elevations receive inputs from defined springs (Stream 3) or underground seeps (Streams 2 and 5). The streams will be restored to original locations; therefore, the existing hydraulic inputs will reflect pre-existing conditions and should provide sufficient flows to maintain a stable intermittent stream planform and morphology.

2.3.2 Vegetation

Prior to impacts, the site was dominated by herbaceous vegetation typical of pastures including tall fescue (*Festuca arundinacea*). As part of farm management, the pastures underwent a rigorous fescue eradication, which will minimize exotic dominance of the restored stream areas. As part of the restoration plan, the restored stream corridors will be seeded with a variety of native grass species. Larger areas in the downstream portions of Streams 2 and 3 will be planted with higher quality riparian tree species.

3.0 SITE PROTECTION INSTRUMENT

The stream restoration area and associated riparian area will be located completely on property owned and maintained by Padua. The stream restoration area will be protected from mowing by maintenance crews and grazing from horses through the construction of exclusion fencing. Additional safe crossings for the farm are not anticipated at this time; however, appropriate regulatory agency approvals will be acquired prior to any impacts to the stream restoration area.

4.0 BASELINE INFORMATION

The proposed resolution of unauthorized impacts entails the reconstruction of on-site streams to conditions prior to impacts; therefore, the impacts and restoration sites are the same. The baseline information provided below characterizes the condition of the streams prior to impacts, the current conditions, and the jurisdictional determination of the site.

4.1 HISTORIC CONDITIONS

The historic conditions of the impact/restoration sites are further discussed below in terms of geographic setting and hydrology.

4.1.1 Geographic Setting

The impact and restoration sites are located in drainages with only moderate topographic relief in the eastern and western portions of the property (Figure 2). The Soil Survey of Fayette County, Kentucky (Issued 1968) maps the stream restoration areas as being underlain by Huntington Silt Loam (Figure 3). The soils associated with this series are characterized as deep and well-drained and are typically found on floodplains. The soil survey also maps two springs and one pond in the upstream portion of Stream 3 and a pond at the upstream end of Stream 5. The stream restoration area is underlain by Lexington Limestone and is located within an area of high karst potential (Figure 4).

4.1.2 Hydrology

The U.S. Geologic Survey 7.5-minute topographic quadrangle map denotes two intermittent blue-line streams on the property (Figure 1). The National Hydrography Dataset depicts four streams on the property (Figure 2), and the streams are not located within the 100-year floodplain (Figure 5). Additional hydrology is provided to the site through the springs and seeps noted along Stream 3 as well as the ponds located upstream of Streams 2 and 5. Stream 2 also receives significant runoff from recent industrial development east of Alexandria Drive.

Based on a review of historic aerial photographs, drainage features were historically located within several of the larger on-site drainages. Figures 6 and 2 present aerial photographs from 1997/1998 and 2007, respectively. However, many of the on-site drainages did not exhibit stream features due to either lack of flow or possible impacts from livestock or extensive infiltration due to karst conditions.

4.2 EXISTING CONDITIONS

In 2008, the on-site drainages were piped and covered with soil in preparation for horse grazing (Figure 7). The piping and grading was performed for all areas within proposed pastures including those with defined streams and those without defined features. Following these activities, the KDOW issued a Notice of Violation to Three Chimneys Farms, and all work in these areas was stopped. Installation of the drainage pipes was not completed, which has resulted in overland surface flow in the larger watersheds of Streams 2 and 3. Currently, there are no defined surface channels, and the drainage areas are dominated by a mixture of upland and wetland herbaceous species.

4.3 JURISDICTIONAL DETERMINATION

The USACE performed a site visit in May 2009 to determine the jurisdiction extent of streams on the property. The jurisdictional determination was based on the soil survey, historic aerials, and conditions in the field. The following table summarizes the on-site jurisdictional streams. The location of each stream is presented on Figure 8.

Stream	Length (feet)	Quality	Flow Regime
Stream 1	660	Poor	Ephemeral
Stream 2	2,450	Poor	Intermittent
Stream 3	1,543*	Poor	Intermittent
Stream 4	710	Poor	Intermittent
Stream 5	350	Poor	Intermittent

* Includes 657 feet of unimpacted channel

An approximately 0.33-acre wetland is located at the downstream end of Stream 3. This area has not been delineated and has not been impacted by grading or piping activities. The approximate location of this feature is shown on Figure 8.

5.0 DETERMINATION OF CREDITS

The determination of credits is discussed below in terms of project mitigation requirements and mitigation credits. A summary of the overall impacts and mitigation is provided as Table 1.

5.1 DETERMINATION OF MITIGATION REQUIREMENTS

The project mitigation requirements are presented below for unauthorized impacts and temporal losses.

5.1.1 Unauthorized Impact Mitigation

Based on the USACE jurisdictional determination, on-site pasture improvements have resulted in impacts to 660 feet of ephemeral stream and 4,396 feet of intermittent stream. Mitigation is not required for impacts to ephemeral streams; therefore, mitigation activities will only address impacts to 4,396 feet of intermittent stream. The following table presents a summary of impacts requiring mitigation.

Stream	Length (feet)	Mitigation	Quality	Flow Regime
Stream 2	2,450	Yes	Poor	Intermittent
Stream 3	886	Yes	Poor	Intermittent
Stream 4	710	Yes	Poor	Intermittent
Stream 5	350	Yes	Poor	Intermittent
TOTAL	4,396			

5.1.2 Temporal Losses

Unauthorized impacts to the intermittent streams were performed in the summer of 2008. The USACE has requested that the restoration plan address temporal losses due to the elapsed time between the impacts and restoration efforts. Based on correspondence with the USACE, a 20 percent increase in mitigation is required to address the project temporal losses. The following table presents a summary of mitigation required for temporal losses.

Stream	Length (feet)	Temporal Loss Mitigation (feet)	Total Mitigation Required (feet)
Stream 2	2,450	490	2,940
Stream 3	886	177	1,063
Stream 4	710	142	852
Stream 5	350	70	420
TOTAL	4,396	879	5,275

5.2 DETERMINATION OF MITIGATION CREDITS

Mitigation for the site impacts will be performed through a combination of on-site stream restoration, on-site stream enhancement, and payment of a fee in-lieu of formal mitigation. The determination of project mitigation credits is presented below for stream restoration, stream enhancement, and in-lieu fee requirements.

5.2.1 Stream Restoration

The on-site intermittent streams will be restored to pre-existing conditions with the exception of safe crossings to be used for pasture access for horses and equipment. Five safe crossings totaling 274 feet are proposed including three crossings of Stream 2 and two crossings of Stream 3. The following table presents a summary of the mitigation credits generated from the on-site stream restoration.

Stream	Length (feet)	Crossing Length (feet)	Mitigation Credits
Stream 2	2,450	150	2,300
Stream 3	886	124	762
Stream 4	710	NA	710
Stream 5	350	NA	350
TOTAL	4,396	274	4,122

5.2.2 Stream Enhancement

On-site restoration activities include the enhancement of the downstream portions of Streams 2 and 3 through planting a 100-foot riparian corridor with wildlife-beneficial native tree species. Based on correspondence with the USACE, a mitigation multiplier of 0.2 is proposed for these activities. The following table presents the mitigation credit generated from these activities.

Stream	Length (feet)	Mitigation Multiplier	Mitigation Credits
Stream 2	749	0.2	150
Stream 3	657	0.2	131
TOTAL	1,406	--	281

5.2.3 In-Lieu Fee Payment

Mitigation requirements in addition stream restoration and enhancement activities will be provided through the payment of a fee to the Kentucky Wetland and Stream Mitigation Fund, which is administered by the Kentucky Department of Fish and Wildlife Resources. To offset impacts not

mitigated through stream restoration or enhancement activities, Padua proposes to pay \$87,200 in-lieu of formal mitigation.

6.0 MITIGATION WORK PLAN

The components of this Plan include the restoration of 4,122 feet of intermittent stream and the enhancement of 1,406 feet of intermittent stream. Implementation for each of these mitigation components is described in more detail below.

6.1 RESTORATION DESIGN CRITERIA

Proposed stream restoration activities include re-establishing the intermittent streams to pre-existing conditions including planform geometry and channel form. Each of these restoration activities is discussed in detail in the following sections.

6.1.1 Planform Geometry

Planform geometry of the intermittent streams prior to impacts was determined through review of historic aerial photographs and the USGS topographic quadrangle maps. Aerial photographs from 1997 through 2008 were reviewed. Through this review, the planform location of Streams 2, 3, and 5 were determined. The location of Stream 4 was not readily discernible in available photographs; therefore, the planform of downstream portion of Stream 4 was based on the National Hydrography Dataset (NHD). The NHD documented the upstream portion of Stream 4 as located on a hillslope; therefore, the upstream portion was field located to the lowest portion of the drainage using global positioning system (GPS) equipment. The locations of the proposed restoration reaches are shown on Figure 9.

6.1.2 Channel Form

Channel form measurements for Streams 2 and 3 are based on cross sections taken from unimpacted portions of the on-site streams. Channel geometry for Streams 4 and 5 were developed based on valley slope, expected discharge, and expected channel materials. Table 2 presents a summary of the channel form for the intermittent restoration reaches. Typical cross sections for each stream are presented on Figure 10. Each of the stream restoration areas is described in detail below.

Stream 2: A typical cross sections for this stream is shown on Figure 10. The approximately 2,450-foot created channel will be approximately 7 feet wide at the bankfull stage with a mean depth in riffles of 0.4 feet. Based on the current ground surface, the stream exhibits three distinct slopes. The upper approximately 700 feet exhibits a slope of 1.67%, the central portion of the stream (approximately 1,400 feet) exhibits a slope of 1.09%, and the lower 400 feet exhibits a slope

of 0.75%. The associated velocities vary between 1.86 and 2.77 ft/sec with a discharge of 5.19 to 7.76 cfs and an expected shear stress between 0.17 and 0.37 lb/ft² in the riffles. Riffles will be constructed every 50 feet to provide grade control. Based on the expected shear stress, the riffles will be constructed of particles greater than 3 inches in diameter.

Stream 3: A typical cross section for this stream is shown on Figure 10. The created channel will be approximately 6 feet wide at the bankfull stage with a mean depth in riffles of 0.4 feet. The overall stream length will be approximately 886 feet with a slope of 1.1%. The associated velocity and discharge will be approximately 2.21 ft/sec and 5.31 cfs, respectively, and an expected shear stress of 0.06 lb/ft² in the riffles. Riffles will be constructed every 50 feet to provide grade control. Based on the expected shear stress, the riffles installed for grade control will be constructed of particles greater than 3 inches in diameter.

Stream 4: A typical cross section for this stream is shown on Figure 10. The created channel will vary between 2 and 3 feet wide at the bankfull stage with a mean depth of 0.5 feet. The overall stream length will be approximately 710 feet with a slope of 2.5%. The associated velocity and discharge will be approximately 3.23 ft/sec and 3.23 cfs, respectively, and an expected shear stress of 0.52 lb/ft². Riffle will be constructed every 50 feet to provide grade control. Based on the expected shear stress, the riffles installed for grade control will be constructed of particles greater than 6 inches in diameter.

Stream 5: A typical cross section for this stream is shown on Figure 10. The created channel will be approximately 2 feet wide at the bankfull stage with a mean depth of 0.5 feet. The overall stream length will be approximately 350 feet with a slope of 2.19%. The associated velocity and discharge will be approximately 3.02 ft/sec and 3.02 cfs, respectively, and an expected shear stress of 0.46 lb/ft². Riffles will be constructed every 50 feet to provide grade control. Based on the expected shear stress, the riffles installed for grade control will be constructed of particles greater than 6 inches in diameter.

6.2 CONSTRUCTION METHODS

Standard grading/construction techniques will be used to re-establish an appropriate stream planform and morphology in the proposed stream restoration area. Generally, construction of each stream will entail the removal of the existing pipe and the establishment of a stable stream channel with the appropriate planform and channel geometry. Immediately following construction activities, the banks of the restored stream channel and other disturbed areas will be seeded and covered with erosion control matting. A total of 40 pounds per acre of the groundcover seed mixture listed in the table below will be sown in the impacted areas.

Scientific Name	Common Name	Pounds per Acre
<i>Agrostis alba</i>	Red Top Grass	2.5
<i>Avena sativa</i>	Oats	20
<i>Elymus riparius</i>	Riverbank Wild Rye	5
<i>Elymus virginicus</i>	Virginia Wild Rye	5
<i>Panicum clandestinum</i>	Deertongue Grass	5
<i>Panicum virgatum</i>	Switch Grass	2.5

6.3 STREAM ENHANCEMENT ACTIVITIES

The goal of the proposed stream enhancement activities is to shade the stream channel and to provide a high quality riparian corridor beneficial for wildlife. Enhancement activities will be performed on 749 feet of Stream 2 and 657 feet of Stream 3 to establish a 100-foot wide wooded corridor (Figure 10). Establishment of the wooded riparian zone will consist of planting three to five gallon containerized trees/shrubs at a density of 60 trees/shrubs per acre (approximately 27-foot centers) throughout the wooded riparian zone restoration area with no one species comprising more than 25% of the total planted. Potential tree and shrub species that will be planted within the riparian area are listed in the following table.

Scientific Name	Common Name	Strata
<i>Betula nigra</i>	River Birch	Tree
<i>Cercis canadensis</i>	Red Bud	Shrub
<i>Cornus amomum</i>	Silky Dogwood	Shrub
<i>Cornus florida</i>	Flowering Dogwood	Shrub
<i>Diospyros virginiana</i>	Persimmon	Tree
<i>Fraxinus americana</i>	White Ash	Tree
<i>Juglans nigra</i>	Black Walnut	Tree
<i>Liquidambar styraciflua</i>	Sweetgum	Tree
<i>Nyssa sylvatica</i>	Black Gum	Tree
<i>Platanus occidentalis</i>	Sycamore	Tree
<i>Populus deltoides</i>	Cottonwood	Tree
<i>Quercus bicolor</i>	Swamp White Oak	Tree
<i>Quercus macrocarpa</i>	Bur Oak	Tree
<i>Quercus michauxii</i>	Swamp Chestnut Oak	Tree
<i>Quercus palustris</i>	Pin Oak	Tree
<i>Quercus rubra</i>	Northern Red Oak	Tree

A minimum of six tree and two shrub species will be planted. Equivalent native species may be substituted depending on availability.

6.4 SCHEDULE

Mitigation implementation will consist of two phases, grading and planting. Grading of the stream restoration areas will be completed in the first dry season (late summer/ early fall) following receipt of all project authorizations to minimize potential soil loss and downstream sediment impacts. Immediately following grading/excavation activities, the stream restoration area will be seeded with the native ground cover seed mix. Containerized trees/shrubs will be planted in the stream enhancement area during the first dormant season following the completion of stream restoration activities (November/December).

6.5 SOURCES OF HYDROLOGY

Hydrology inputs to the stream restoration area will include precipitation, springs/seeps, and surface runoff from the adjacent properties.

6.6 SOIL MANAGEMENT

Excess material generated from excavation of the channel will be permanently moved to upland locations and stabilized to prevent erosion.

6.7 EROSION CONTROL

Best Management Practices will be used throughout construction to minimize erosion and sedimentation impacts to the stream. The practices could include, but are not limited to, timing of construction to avoid periods of high rainfall and stream flow, proper placement of erosion control structures below highly disturbed areas to minimize silt entry into the stream, silt fencing, straw bales, erosion control matting, and revegetation of exposed soil immediately following final grading.

7.0 MAINTENANCE PLAN

Based on the design and location of the proposed mitigation, the need for active maintenance of the site should be minimal. The monitoring program will include site visits throughout each year to ensure the establishment of stable conditions within the stream restoration area. Areas needing maintenance will be noted during monitoring, and appropriate repair actions will be coordinated with the USACE and KDOW prior to initiation. The location of the restoration area within the farm will allow it to be maintained by Padua maintenance personnel, who will provide any needed repairs or adjustments. Maintenance activities after successful completion of the monitoring program should be minimal, but could include sideslope erosion repairs, replanting of trees, control of invasive species, debris removal after flood events, or repair of exclusion fencing to restrict horse access.

8.0 PERFORMANCE STANDARDS

Discrete, measurable performance standards have been established to ensure that the site develops appropriate aquatic and riparian habitats. The performance standards required to document project success are as follows:

- The establishment of a minimum of 90% (54 per acre) of planted container trees in the stream enhancement areas. Natural establishment of native species will be allowed to compensate for up to 20% of this requirement, but only at a 5:1 ratio (5 volunteers replacing 1 planted tree).
- No evidence of undue instability or undue erosion/sedimentation in constructed features including graded channel, streambanks, or adjacent sideslopes.

Site conditions will be measured through the established monitoring plan (Section 9.0) that will clearly document whether or not each of these performance standards has been met.

9.0 MONITORING REQUIREMENTS

The success of the restoration efforts will be determined by following an established monitoring plan. Monitoring will be conducted for three years, during which annual reports on mitigation success will be submitted to the USACE and KDOW for review. After this three-year monitoring period, mitigation success will be evaluated to determine if plan modifications and/or additional monitoring will be required. Detailed field surveys will focus on stream stability in the stream restoration areas, woody species survival and composition in the stream enhancement areas, and overall site development. Monitoring is described below in terms of stream stability, woody species establishment, overall site development, reporting, and release from monitoring.

9.1 STREAM STABILITY

During the regular site monitoring visits (minimum of two per year), the site will be evaluated in terms of overall stability of the stream channels and corridors. A pedestrian survey of the restored channels will be performed to document areas of undue erosion or sedimentation, unstable streambanks, large areas of exposed soil, and significantly aggrading or degrading stream beds. Field notes and photographs will be used to document observed conditions.

9.2 WOODY VEGETATION ESTABLISHMENT

Woody vegetation monitoring will be performed once a year in early summer. Results of the sampling will provide a quantifiable means of evaluating the establishment of woody species within the stream restoration area. The successful establishment of woody vegetation will be monitored through stem counts within permanent plots along the restored stream corridors. Two monitoring plots will be established in each enhancement area. In addition, a list of all woody species identified within the riparian corridor will be compiled during all site visits throughout the year in order to track overall development of the restoration activities.

9.3 OVERALL SITE DEVELOPMENT

In addition to the stream stability and vegetation monitoring, photographs will be taken to highlight and document establishment of the overall stream channel and riparian corridor. During each monitoring event, the site will be evaluated in terms of stability of the restored stream channels, riparian corridors, adjacent basins, sideslopes, and exclusion fence conditions. Photographs and notes will be taken to document representative plant communities and overall site stability and establishment.

9.4 REPORTING

Mitigation monitoring will be completed annually by early fall. Annual progress reports will be prepared which summarize the field data collected and note significant trends. These reports will be submitted to the USACE and KDOW for review by December 31 of the same calendar year. Following the third year of monitoring, a final report will be prepared documenting the status of the project, and discussing whether or not all success criteria have been adequately met.

9.5 RELEASE FROM MONITORING

Monitoring will be conducted for three years, during which annual reports on mitigation success will be submitted to the USACE and KDOW. After this three-year monitoring period, mitigation success will be evaluated to determine if plan modifications and/or additional monitoring will be required. If the minimum success criteria have been met, the project will be considered complete and will be released from further monitoring requirements. If success criteria have not been met, contingency plans will be implemented (in coordination with the USACE and KDOW) and monitoring will continue on a per year basis until deemed successful by the USACE and KDOW.

10.0 LONG-TERM MANAGEMENT PLAN

The overall design and location of the proposed mitigation should minimize the need for extensive long-term management of the restoration areas. Any major management issues should be evident and able to be addressed during the three years of required monitoring. However, Padua will be responsible for the long-term management of the mitigation area. The mitigation area is located on the Padua farm and will remain under its control for the foreseeable future. The maintenance staff will be in a position to regularly observe conditions in the restoration area and directly address any management/maintenance issues as directed by the owners.

11.0 ADAPTIVE MANAGEMENT PLAN

If the mitigation effort is determined to be successful at the end of the three-year monitoring period, monitoring will be terminated. If the mitigation is determined to be only partially successful, appropriate adjustments to the mitigation scenario will be undertaken. If minimum performance standards for the establishment of the wooded riparian corridor are not achieved, reseeding of groundcover, or replanting of trees may be required. Erosion/sedimentation issues will be addressed through implementation of Best Management Practices and extended monitoring. No contingency plans will be implemented without prior coordination with the USACE and KDOW. Following any adjustments, monitoring will continue until the mitigation is deemed successful.

12.0 FINANCIAL ASSURANCES

The design of the proposed mitigation within an existing stream corridor and within the existing Padua farm eliminates the need for specific financial assurance mechanisms. The overall success of the mitigation project will be ensured through completion of the required three-year monitoring period, the long-term protection of the site through the restoration location within the Padua farm, and the long-term commitment to management by the Padua through its maintenance staff.

13.0 CONCLUSION

In order to compensate for unauthorized impacts to 4,396 feet of intermittent stream on the Padua Stables farm pasture, Padua Stables (KY), LLC commits to: restoration of 4,122 feet of intermittent stream channel to stable, pre-existing conditions; enhancement of 1,406 feet of intermittent stream corridor to a wooded riparian zone; and payment of a \$87,200 in-lieu fee to the Kentucky Wetland and Stream Mitigation Fund. This proposed restoration will more than compensate for the past unauthorized impacts and result in stable stream channels/corridors that will not adversely impact downstream aquatic resources.

TABLES

Table 1 - Mitigation Summary
Padua Stables Project
Fayette County, Kentucky

On-site Mitigation:

Stream Name	Stream Type	Impacts		Mitigation			Total
		Length (ft)	Multiplier**	Debit	Length (ft)	Type	Credit
1*	Ephemeral	660					
2	Intermittent	2,450	1.2	2940	2,300	Restoration	2,300
					749	Enhancement	150
3	Intermittent	886	1.2	1063	762	Restoration	762
					657	Enhancement	131
4	Intermittent	710	1.2	852	710	Restoration	710
5	Intermittent	350	1.2	420	350	Restoration	350
		Total =		5,275	Total=		4,403
							-490
							-170
							-142
							-70
							-872

Notes:

* - Mitigation is not proposed for ephemeral stream impacts

** - A multiplier of 1.2 was used to account for temporal losses

In-Lieu Fee Calculation:

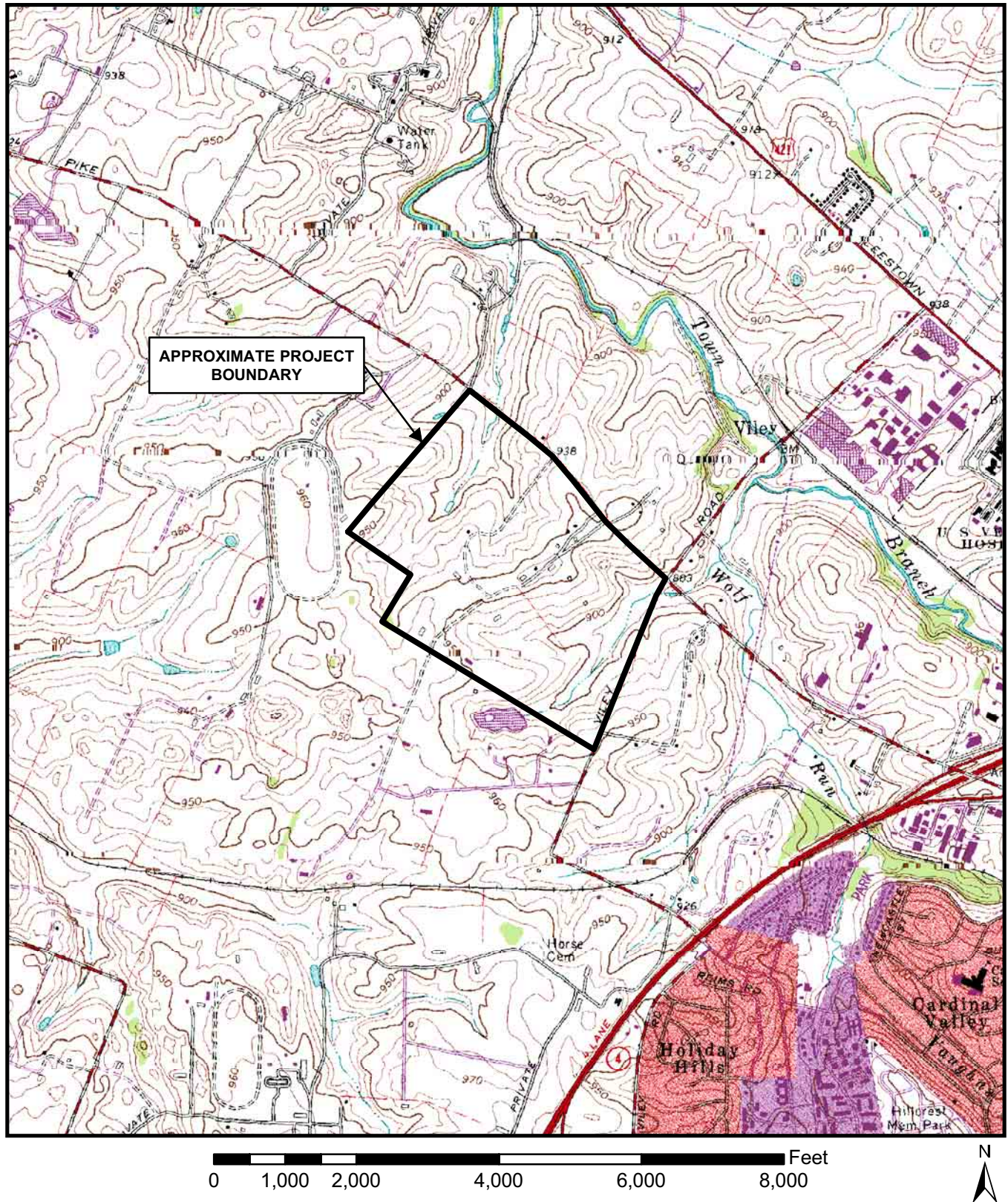
Stream	Unmitigated Length (ft)	Unit Cost	Cost
2	490	\$100	\$49,000
3	170	\$100	\$17,000
4	142	\$100	\$14,200
5	70	\$100	\$7,000
		Total=	\$87,200

**Table 2 - Design Summary
Padua Stables Project
Fayette County, Kentucky**

Component	Stream			
	Stream 2	Stream 3	Stream 4	Stream 5
Drainage Area (sq. miles)	0.37	0.36	0.09	0.07
Rosgen Stream Type (Level II)	B	B	B	B
Bankfull Discharge (cfs)	7.76	5.31	3.23	3.02
D84 Riffle/Pavement (mm)	76	76	152	152
Bankfull Shear Stress (tau in lb/ft ²)	0.16-0.37	0.24	2.5	2.2
Channel Slope (%)	0.75-1.67	1.09	2.5	2.19
Valley Slope (%)	1.23	1.22	2.98	2.62
Sinuosity	1.02	1.11	1.03	1.19
Avg. Riffle Depth (@BKF in ft)	0.4	0.4	0.5	0.5
Bankfull Width (ft)	7	6	2-3	2
Bankfull Area (ft ²)	2.8	2.4	1.0-1.5	1
Width/Depth Ratio	17.5	15	6	4
Wetted Perimeter (ft)	7.8	6.8	3-4	3
Hydraulic Radius (ft)	0.36	0.35	0.38	0.33

FIGURES

Source: USGS 7.5-Minute Topographic Quadrangle Maps - Lexington West Quad



PADUA STABLES PROJECT
FAYETTE COUNTY, KENTUCKY

FILE: Redwing/09-070/Figures/Site Location

REDWING PROJECT 09-070

REVISION DATE 11/4/09

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SITE LOCATION MAP

FIGURE 1

Source: Fayette County Orthoimagery (2007) (<http://kygeonet.ky.gov>)



0 600 1,200 1,800 2,400 Feet



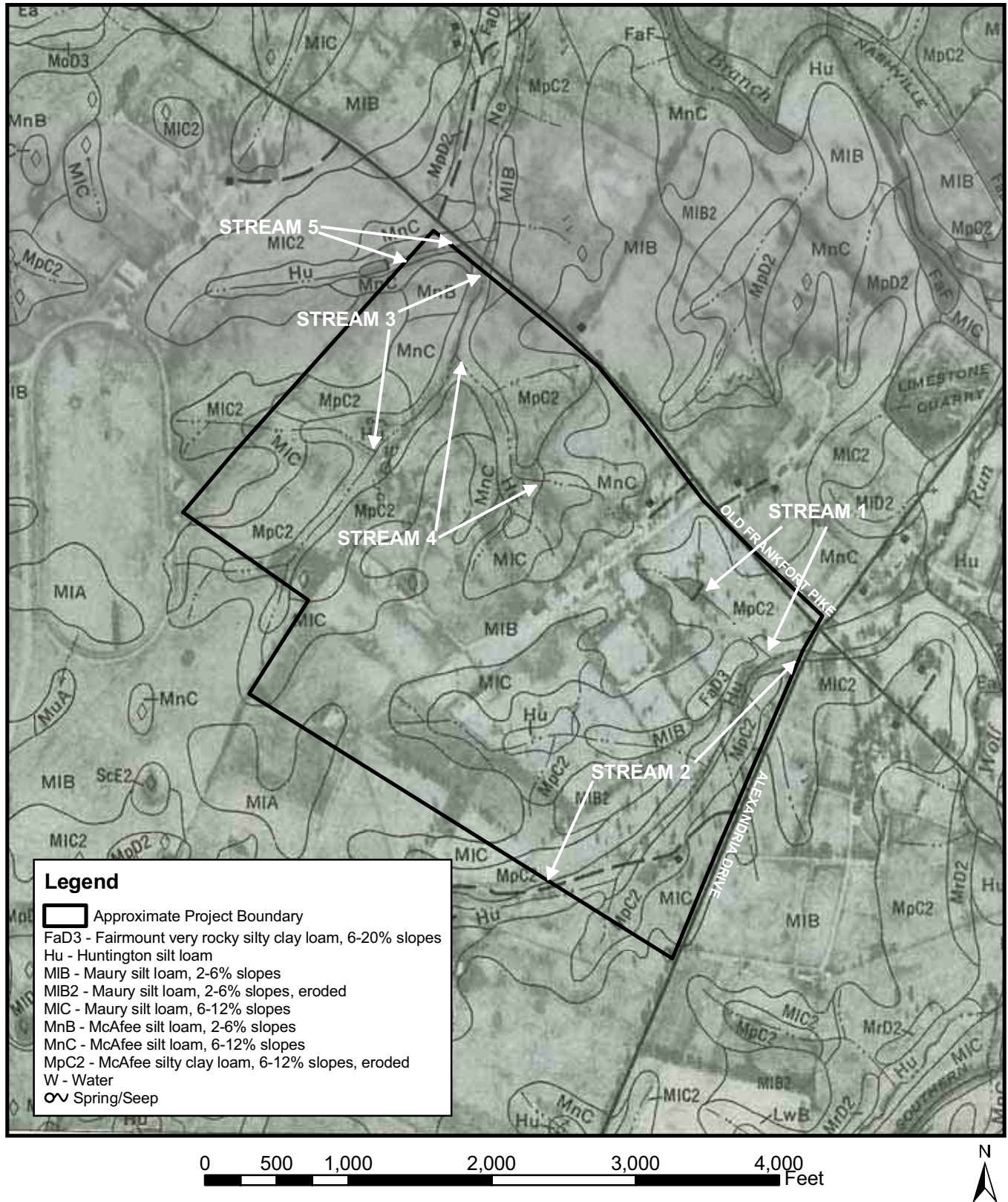
PADUA STABLES PROJECT FAYETTE COUNTY, KENTUCKY	
FILE: Redwing/09-070/Figures/Fig2-2007 Aerial	
REDWING PROJECT 09-070	
REVISION DATE 11/4/09	DRAWN BY RSC/LMB/LAD



2007 AERIAL PHOTOGRAPH

FIGURE 2

Source: USDA Soil Survey for Fayette County, Kentucky (1968)



PADUA STABLES PROJECT
FAYETTE COUNTY, KENTUCKY

FILE: Redwing/09-070/Figures/Soils

REDWING PROJECT 09-070

REVISION DATE 11/4/09

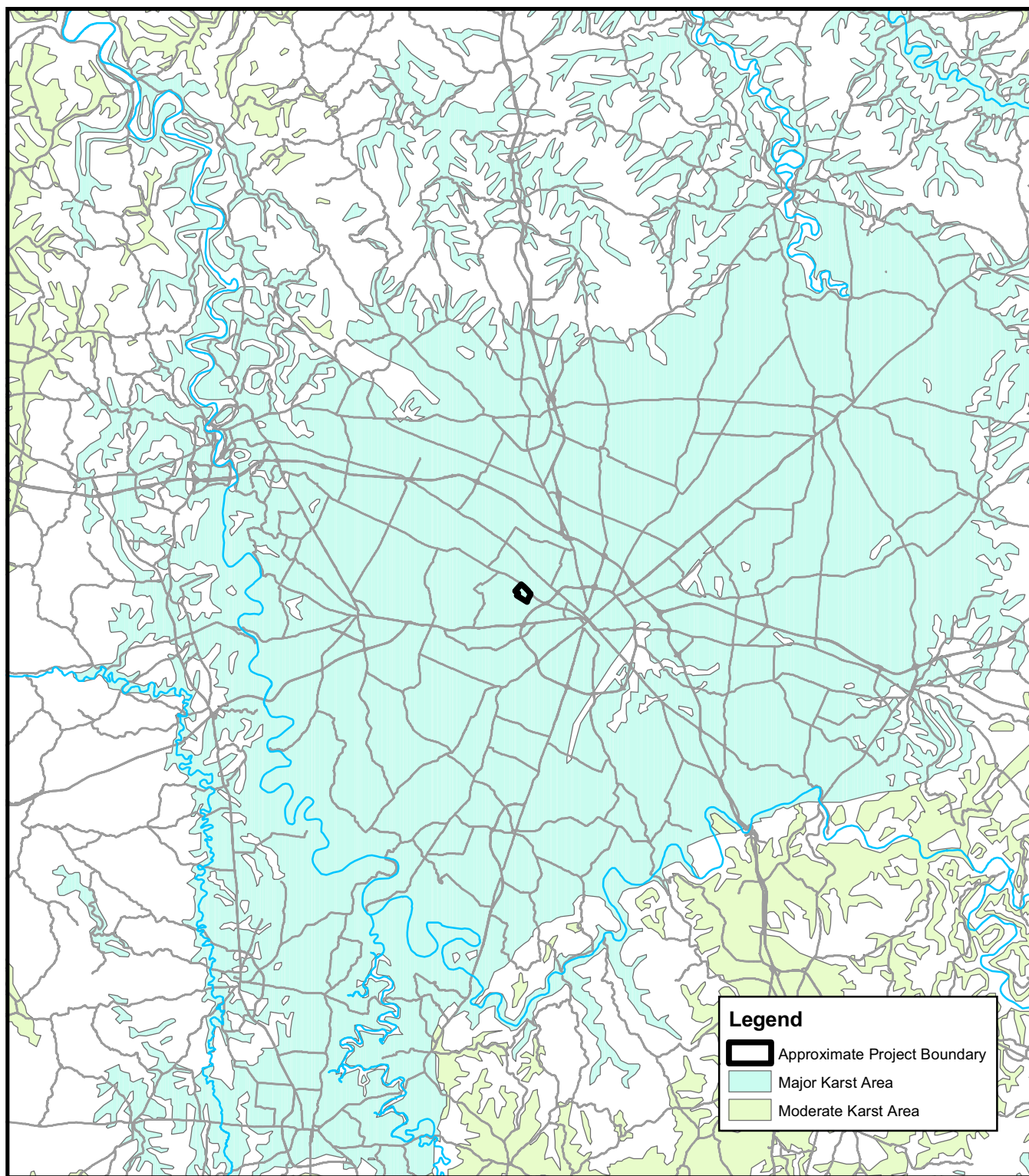
DRAWN BY LMB



SOIL SURVEY MAP

FIGURE 3

Source: Kentucky Geologic Survey - Karst Occurrence in Kentucky (2005)



PADUA STABLES PROJECT
FAYETTE COUNTY, KENTUCKY

FILE: Redwing/09-070/Figures/Karst Areas

REDWING PROJECT 09-070

REVISION DATE 11/4/09

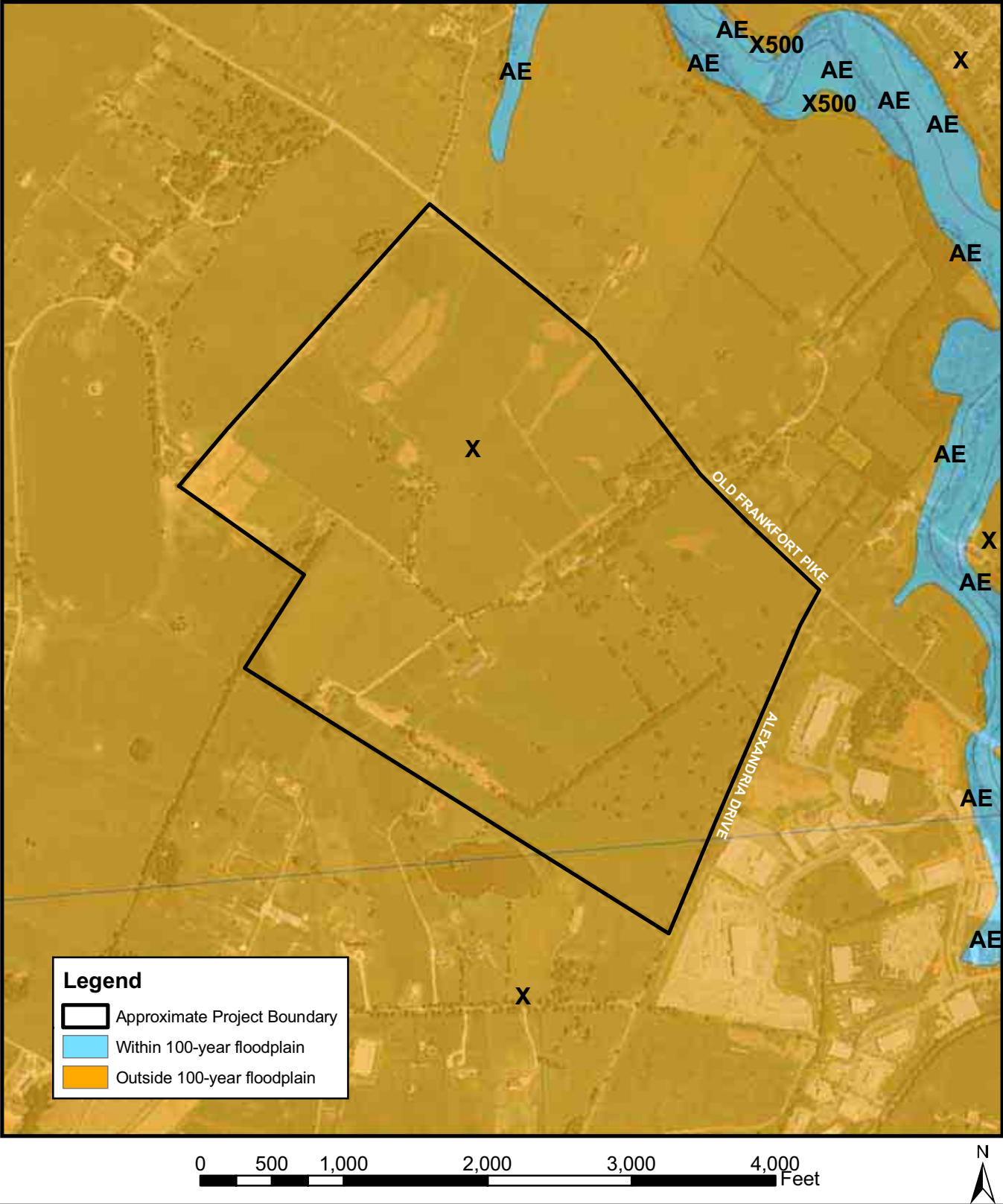
DRAWN BY LMB



KARST FEATURES MAP

FIGURE 4

Source: FEMA Q3 Flood Data for Kentucky (1998); FSA NAIP Ortho Imagery for Kentucky (2008)



PADUA STABLES PROJECT
FAYETTE COUNTY, KENTUCKY

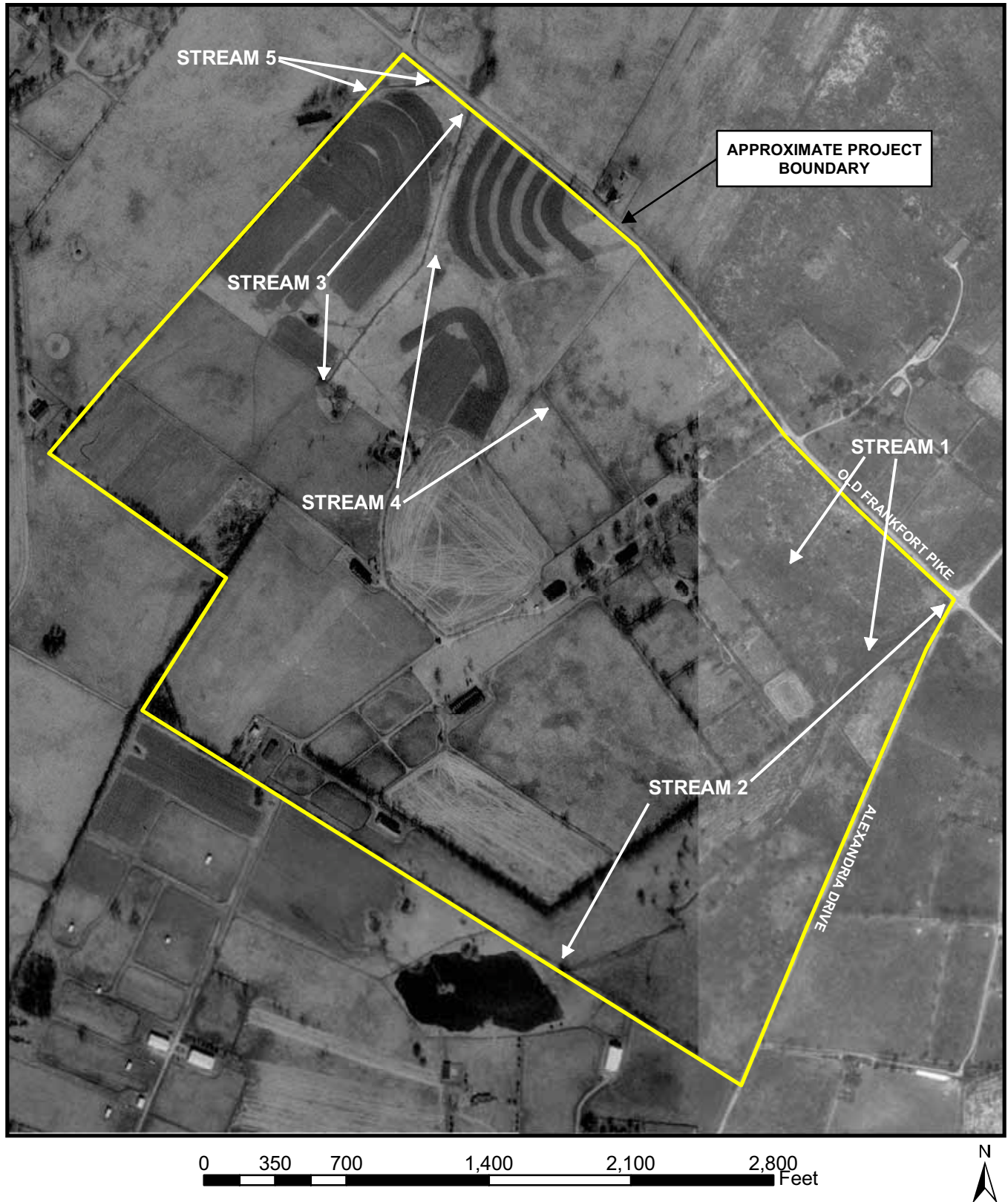


FEMA FLOODPLAIN MAP

FILE: Redwing/09-070/Figures/FEMA	
REDWING PROJECT 09-070	
REVISION DATE 11/4/09	DRAWN BY LMB

FIGURE 5

Source: Kentucky Division of Geographic Information Digital Ortho Imagery (1997 and 1998)



PADUA STABLES PROJECT
FAYETTE COUNTY, KENTUCKY

FILE: Redwing/09-070/Figures/Aerial

REDWING PROJECT 09-070

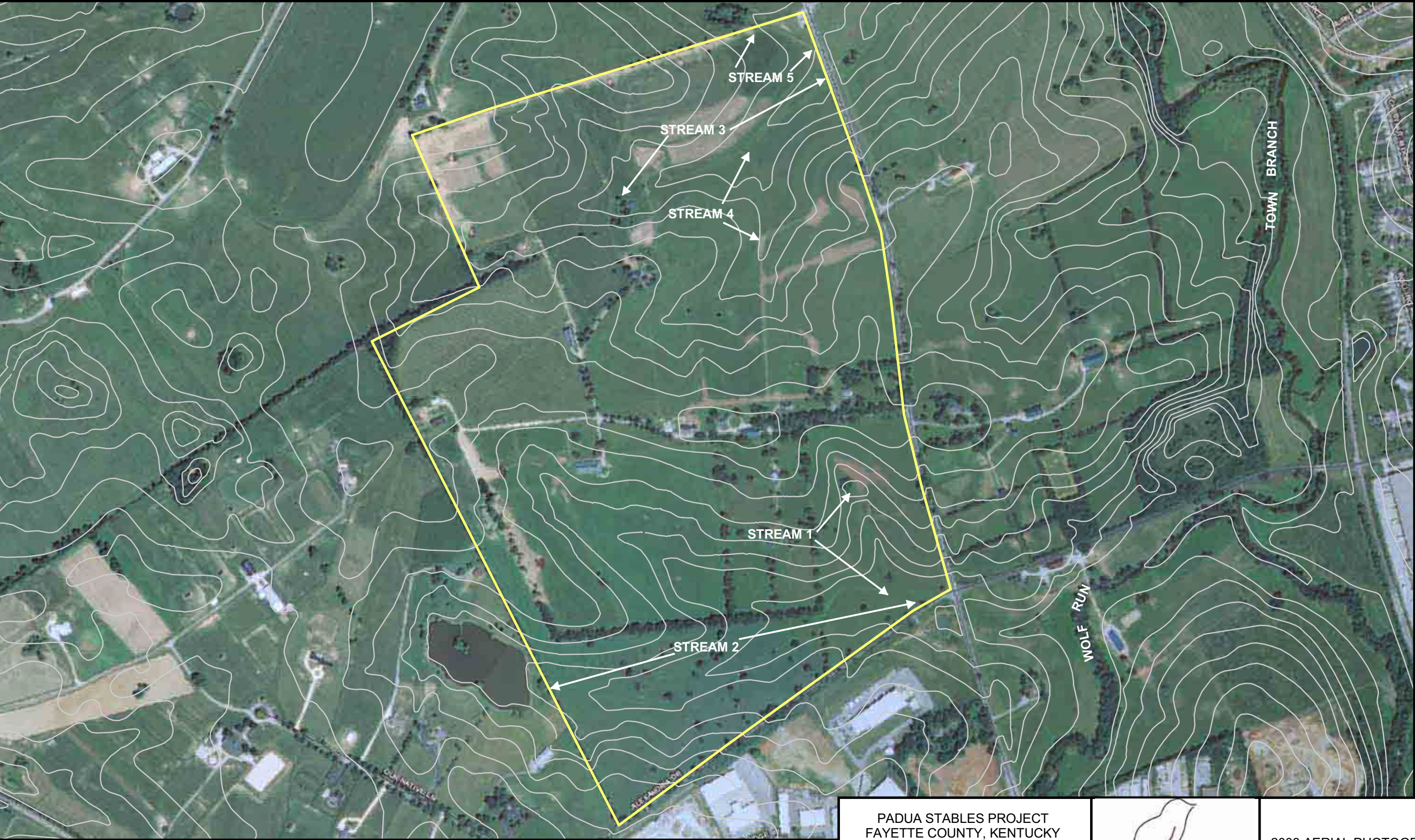
REVISION DATE 11/4/09

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1997 / 1998
AERIAL PHOTOGRAPH

FIGURE 6



0 600 1,200 1,800 2,400 Feet



PADUA STABLES PROJECT
FAYETTE COUNTY, KENTUCKY

FILE: Redwing/09-070/Figures/Fig7-2008 Aerial
REDWING PROJECT 09-070
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2008 AERIAL PHOTOGRAPH

FIGURE 7



Legend

- Approximate Project Boundary
- Approximate Wetland Location
- Intermittent Stream
- Ephemeral Stream

0 300 600 1,200 1,800 2,400 Feet



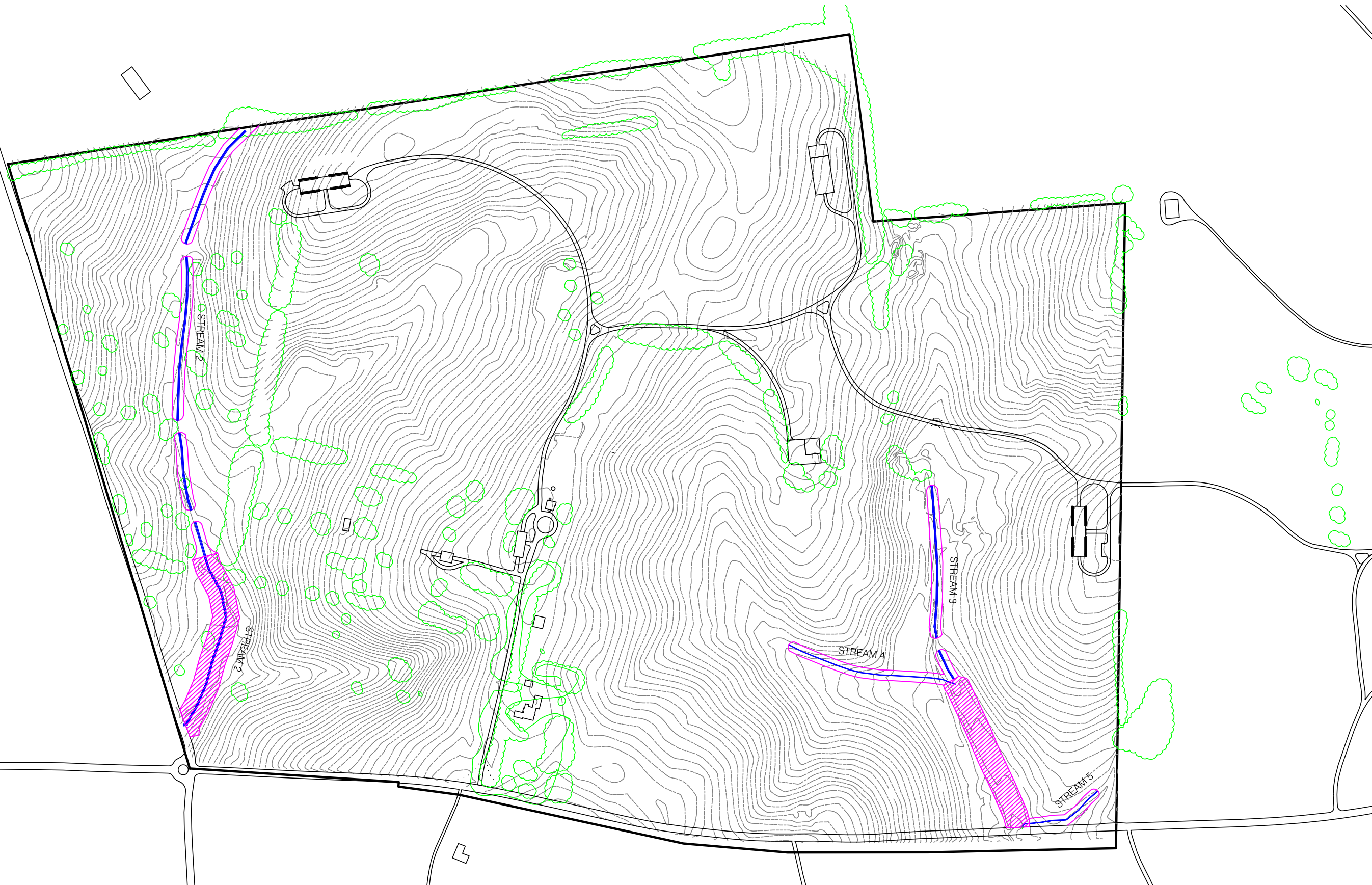
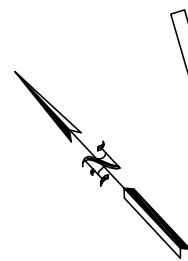
PADUA STABLES PROJECT
FAYETTE COUNTY, KENTUCKY

FILE: Redwing/09-070/Figures/Fig8-JD Map
REDWING PROJECT 09-070
REVISION DATE 11/4/09 DRAWN BY RSC/LMB/LAD



JURISDICTIONAL
DETERMINATION MAP

FIGURE 8



LEGEND

- BOUNDARY
- INTERMITTENT STREAM RESTORATION
- PROPOSED RIPARIAN CORRIDOR
- INTERMITTENT STREAM ENHANCEMENT

400 200 0 400
SCALE IN FEET

SOURCE: BASE MAP PROVIDED BY WEE LANDSCAPE ARCHITECTURE, INC.

PADUA STABLES PROJECT
FAYETTE COUNTY, KENTUCKY

FILENAME: Redwing/09-070/Figures/Restoration Plan

PROJECT No.: 09-070

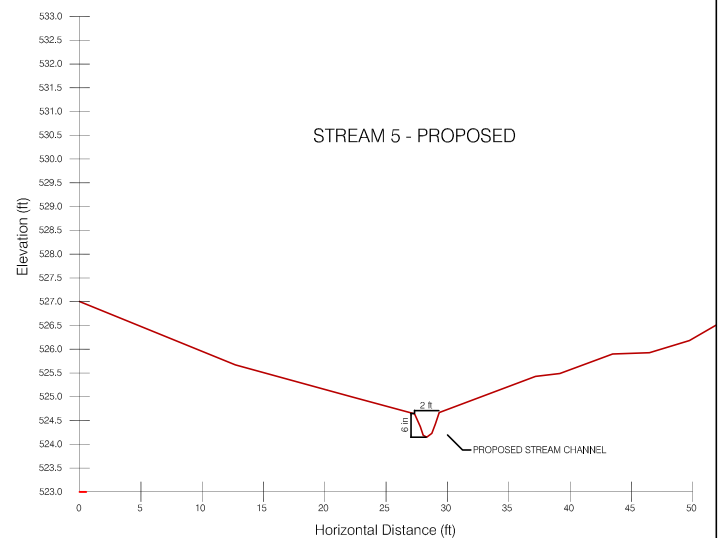
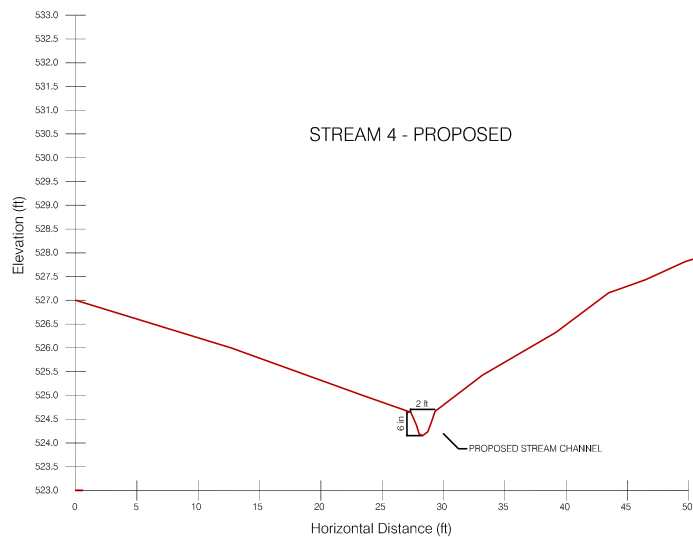
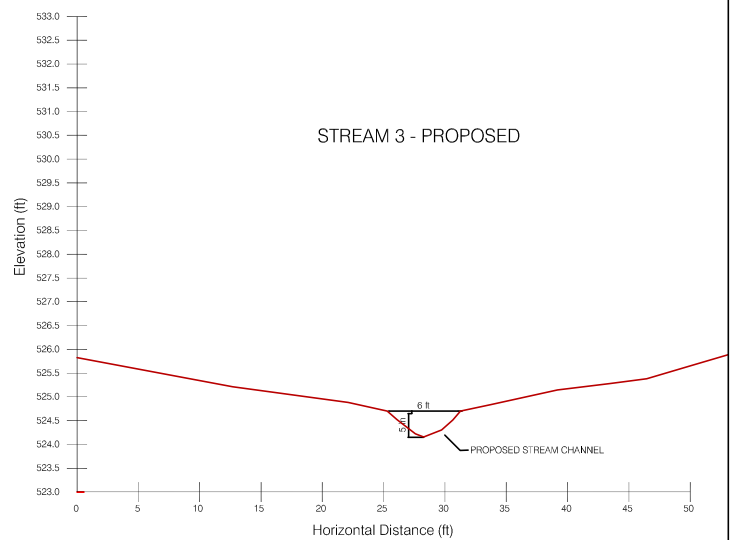
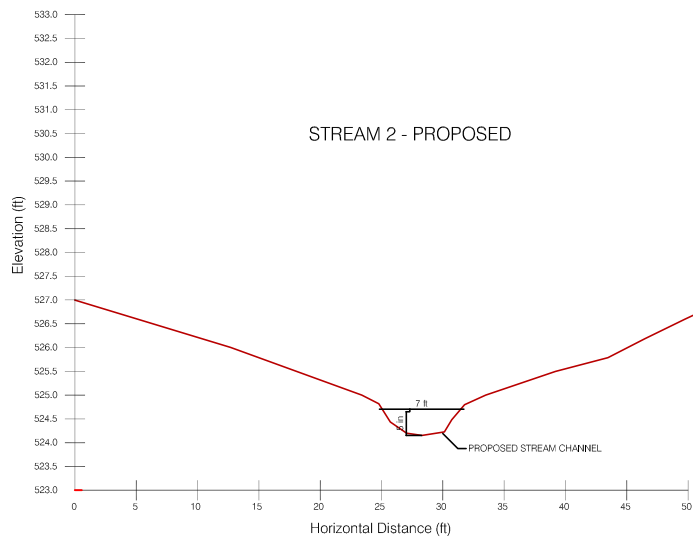
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REVISION DATE: 11-3-09



PROPOSED MITIGATION MAP

FIGURE: 9



PADUA STABLES PROJECT
FAYETTE COUNTY, KENTUCKY

FILENAME: Redwing\Figures\09-070\Figures\Cross Sections

PROJECT No.: 09-070

DRAWN BY: RSC

REVISION DATE: 11-3-09



PROPOSED CROSS SECTIONS

FIGURE: 10

PHOTOGRAPHS



Photograph 1: General view of the restoration area for Stream 3. Padua Stables Project. October 26, 2009.



Photograph 2: General view of the restoration area for Stream 2. Padua Stables Project. October 26, 2009.



Photograph 3: General view of the restoration area for Stream 4 looking upgradient in the central portion of the restoration area. Padua Stables Project. October 26, 2009.



Photograph 4: General view of the restoration area for Stream 5 looking downgradient toward Old Frankfort Pike. Padua Stables Project. October 26, 2009.



Photograph 5: General view of the stream enhancement area along the downstream portion of Stream 2. Padua Stables Project. October 26, 2009.



Photograph 6: General view of the stream enhancement area along the downstream portion of Stream 3 looking downgradient toward Old Frankfort Pike. Padua Stables Project. October 26, 2009.